

WE CLAIM:

1. A protein derived from an enterically transmitted non-A/non-B viral hepatitis agent whose genome contains a region which is homologous to a coding region of the 1.33 kb DNA EcoRI insert present in plasmid pTZKF1(ET1.1) carried in E. coli strain BB4 and having ATCC deposit no. 67717.

2. The protein of claim 1, which is encoded by a complete coding region within said 1.33 kb EcoRI insert.

3. A recombinant protein derived from an enterically transmitted nonA/nonB viral hepatitis agent whose genome contains a region which is homologous to a coding region of a DNA molecule having a first sequence (SEQ ID NO.1):

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AGACCTGTCC CTGTTGCAGC TATTCTACCA CCCTGCCCGG AGCTCGAACA GGGCCTTCTC 60
TACCTGCCCC AGGAGCTCAC CACCTGTGAT ATGTGCTGTA CATTGAATT AACAGACATT 120
GTGCACTGCC GCATGCCCGC CCCGAGCCAG CCAAGGCCG TGCTGTCCAC ACTCGTGGGC 180
CGCTACGGCG GTCCGACAAA GCTCTACAAT GCTTCCCACT CTGATGTTTG CGACTCTCTC 240
GCCCCTTTTA TCCCAGCCAT TGGCCCCGTA CAGGTTACAA CTTGTGAATT GTACGAGCTA 300
GTGGAGGCCA TGGTCCAGAA GGGCCAGGAT GGCTCCGCCG TCCTTGAGCT TGATCTTTGC 360
AACCGTGACG TGTCCAGGAT CACCTTCTTC CAGAAAGATT GTAACAAGTT CACCACAGGT 420
GAGACCATTG CCCATGGTAA AGTGGGCCAG GGCATCTCGG CTTGGAGCAA GACCTTCTGC 480
GCCCTCTTTG GCCCTGGTT CCGCGCTATT GAGAAGGCTA TTCTGGCCCT GCTCCCTCAG 540
GGTGTGTTTT ACGGTGATGC CTTTGATGAC ACCGTCTTCT CGGCGGCTGT GGCCGCAGCA 600
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TCTCTGGGTC TAGAGTGTGC TATTATGGAG GAGTGTGGGA TGCCGCAGTG GCTCATCCGC 720
CTGTATCACC TTATAAGGTC TGGTGGATC TTGCAGGCCC CGAAGGAGTC TCTGCGAGGG 780
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GCCGTTATTA CCCACTGTTA TGACTTCCGC GATTTTCAGG TGCTGCCTT TAAAGGTGAT 900
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GATTGATAG TGTATTGAG TGATATGAT GAGATGAG GAGGTGCTGT CCTGATCGCC 960
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 5 GTGGGCGGCG GCTTGGGCG GTCGCTGAT GTTGTGGCT TCGCGGGCG GCTTACCGAG 1080
 AAGAATTGGG GCGGTGGCG TGAGGGGGG GAGGAGCTCC GCTCGCTGT TAGTGATTTC 1140
 10 CTCGCAAGG TACGAAATGT AGGTGAGATG TGTGTGATG TTGTTTCCCG TGTTTATGGG 1200
 GTTTCCCGTG GACTGTTCA TAACGTGAT GGCATGCTAC AGGTGTTGC TGATGGCAAG 1260
 GCACATTCA CTGAGTCAGT AAAAGCAATG CTGA 1295

a second sequence (SEQ ID NO.5):

TCGAGCACTG GTTTACTGA CTCAGTGAAT TGTGCTTGC CATCAGCAAC AGCCTGTAGC 60
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 20 ACACACATCT GAGCTACATT CGTGAGCTTG CGGAGGAAAT CACTAACAGC GAGGCGGAGC 180
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 25 ACAACATCAG GGAGCGCGCC AAGGCGGGG GGCACCAAA CACCTGCATA CAAACCGATC 300
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 CTCTGACGAT ACTCACTGCA AAGCACTATC GAATCATCAC CTTTAAAGGC AGCCACCTGA 420
 30 AAATCGCGGA AGTCATAACA GTGGGTAATA ACGGCCATAT TCCAGACAGT ATTCCATAGA 480
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 55 TTGCGCTGGC TCGGGGCGGC CATGCGGCAG TGCACAATGT CTGTTAATTC AAATGTTACG 1200

A C A C T A T C A C A G G T G G T G A G C T C C T G G G G C A G G T A G A G A A G G C C C T G T T C G A G C T C G G G G 1260
 C A G G G T G G T A G A A C A G C C T G C A A C A G G G A C A G G T C T 1295
 5 a third sequence (SEQ ID NO.6):
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 G G C A T C A C T A C T G C T A T T G A G C A G G C T G T A G C A G G G G C C A A C T C T G C C T G G C G A A T 117
 10 G C T G T G G T A G T T A G G C C T T T C T C T C T C A G C A G A T T G A G A C C C A T T A A C C T A A T G 177
 C A A C C T C G C C A G C T T G T T T C G C C C C G A G G T T T C T G S A A T C A T C C C A T C C A G C G T G T C 237
 A T C C A T A A C G A G C T G G A G C T T A C T G C C G C G C C G C C G C T C C G G C G C T G T C T T G A A A T T G G C 297
 15 G C C C A T C C C C G C T C A A T A A A T G A T A A T C C T A A T G T G G T C C A C C G C T G C T T C C T C G C C C T 357
 G T T G G G C G T G A T G T T C A G C C T G G T A T A C T G C T C C A C T C G C G G G C C G G C T G C T A A T T G C 417
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 C C A T C T G A T G T C G C C G A G G C C A T G T T C C G C C A T G G T A T G A C G C G C T C T A T G C C C C T C 597
 25 C A T C T T C C G C C T G A G G T C C T C T G C C C C C T G G C A C A T A T C G C A C C G C A T C G T A T T T G C T A 657
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 C T C G T T A T C G A G C G G T T A G G G C A T T G G C T G C A C T T T G T T C T C T T G C T C A C G G C A G C C 837
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 55 G C C G T C G G C G A C C A G G G T C A T G A T A A T S A A G C C A T G A G G G T C C G A T G T T G A C C C T G C T 1557

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 a fourth sequence (SEQ ID NO.10):
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 30 GAGGTTTTTT GGAATCACCT GATTCAACGT GTTATACATA ATGAGCTTCA GCAGTATTGC 240
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	TGGGAGCGGA ACCACCGCGC GTTGAAGAG GTTACCTAA CAGAGCTGGC GGCTCGGTGG	2760
5	TTTGAATCCA ACCGCCCCGG TCAGCCGAGG TTGAACATAA CTGAGGATAC CGCCCGTGCG	2820
	GCCAACTGG CCGTGGAGCT TGACTCGGG AGTGAAGTAG GCGCGCATG TGCCGGGTGT	2880
10	AAAGTCGAGC CTGGCGTTGT GCGGTATCAG TTACAGCGC GTGTCCCGG CTCTGGCAAG	2940
	TCAAAGTCG TGCAACAGGC GGATGTGGAT GTTGTGTG TGCCCACTCG CGAGCTTCGG	3000
	AACGCTTGGC GCGCGCGGG GTTGCAGCA TTAAGTCGCG AACTGCGGC CCGTGTCACT	3060
15	AGCGGCCGTA GGGTTGTCAT TGATGAGGCG CTTGCGTCC CCCCACACTT GCTGCTTTTA	3120
	CATATGCAGC GTGCTGCATC TGTGCACCTC CTGGGGGACC CGAATCAGAT CCCC GCCATA	3180
20	GATTTTGAGC ACACCGGTCT GATTCCAGCA ATACGGCCGG AGTTGGTCCC GACTTCATGG	3240
	TGGCATGTCA CCCACCGTTG CCGTGCAGAT GTCTGTGAGT TAGTCCGTGG TGCTTACCCT	3300
	AAAATCCAGA CTACAAGTAA GGTGCTCGT TCCCTTTTCT GGGGAGAGCC AGCTGTGCGC	3360
25	CAGAAGCTAG TGTTACACA GGCTGCTAAG GCGCGCACC CCGGATCTAT AACGGTCCAT	3420
	GAGGCCCAGG GTGCCACTTT TACCACTACA ACTATAATTG CAAGTGCAGA TGCCCGTGGC	3480
30	CTCATACAGT CCTCCCGGGC TACGCTATA GTTGTCTCA CTAGGCATAA TGAAAAATGT	3540
	GTTATACTTG ACTCTCCCGG CCGTGTGCT GAAGTGGGTA TCTCAGATGC CATTGTTAAT	3600
	AATTTCTCC TTTCGGGTGG CAGGTTGGT CACCAGAGAC CATCGGTCAT TCCGCGAGGC	3660
35	AACCCTGACC GCAATGTTGA CGTCTTGGC GCGTTCCAC CTTCATGCCA AATAAGCGCC	3720
	TTCCATCAGC TTGCTGAGGA GCTGGGCCAC CGGCCGGCGC CGGTGGCGGC TGTGCTACCT	3780
40	CCCTGCCCTG AGCTTGAGCA GGGCCTTCTC TATCTGCCAC AGGAGCTAGC CTCCTGTGAC	3840
	AGTGTGTGA CATTGAGCT AACTGACATT GTGCACTGCC GCATGGCGGC CCCTAGCCAA	3900
	AGGAAAGCTG TTTGTCCAC GCTGGTAGGC CGGTATGGCA GACGCACAAG GCTTTATGAT	3960
45	GCGGGTCACA CCGATGTCCG CGCCTCCCTT GCGCGCTTTA TTCCCACTCT CGGGCGGGTT	4020
	ACTGCCACCA CCGTGAAGT CTTGAGCTT GTAGAGGCGA TGGTGGAGAA GGGCCAAGAC	4080
50	GGTTCAGCGC TCCTCGAGTT GGATTTGTGC AGCCGAGATG TCTCCCGCAT AACCTTTTTT	4140
	CAGAAGGATT GTAACAAGT CACGACCGG GAGACAAATG CGCATGGCAA AGTCGGTCAG	4200
	GGTATCTTCC GCTGGAGTAA GAGTTTTGT GCGCTGTTTG GCCCTGGTT CCGTGCATG	4260
55	GAGAAGGCTA TTCTATCCCT TTTACACAA GCTGTGTTCT ACGGGGATGC TTATGACGAC	4320

	TCAGTATTCT CTGCTGCCGT GGCTGGCGCC AGCCATGCCA TGGTGTTGA AAATGATTTT	4380
	TCTGAGTTTG ACTCGACTCA GAATAACITT TCCCTAGGTC TTGAGTGCGC CATTATGGAA	4440
5	GAGTGTGGTA TGCCCCAGTG GCTTGTGAGG TTGTACCATG CCGTCCGGTC GGCGTGGATC	4500
	CTGCAGGCCC CAAAAGAGTC TTGAGAGGG TTCTGGAAGA AGCATTCTGG TGAGCCGGGC	4560
10	AGCTTGCTCT GGAATACGGT GTGGAACATG GCAATCATTG CCCATTGCTA TGAGTTCCGG	4620
	GACCTCCAGG TTGCCGCCCT CAAGGGCGAC GACTCGGTG TCCTCTGTAG TGAATACCGC	4680
	CAGAGCCGAG GCGCGGTTG GCTTATAGCA GGCTGTGGTT TGAAGTTGAA GGCTGACTTC	4740
15	CGGCCGATTG GGCTGTATGC CGGGGTTGTC GTGCCCCGG GGCTCGGGGC CCTACCCGAT	4800
	GTCGTTGAT TCGCCGAGC GCTTCGGAG AAGAACTGGG GGCTGATCC GGAGCGGGCA	4860
20	GAGCAGCTCC GCCTCGCCGT GCAGGATTTC CTCGTAGGT TAACGAATGT GGCCAGATT	4920
	TGTGTTGAGG TGGTGCTAG AGTTTACGGG GTTCCCCGG GTCTGGTTCA TAACCTGATA	4980
	GGCATGCTCC AGACTATTGG TGATGGAAG GCGCATTTTA CAGAGTCTGT TAAGCTATA	5040
25	CTTGACCTTA CACACTCAAT TATGCACCGG TCTGAATGAA TAACATGTGG TTTGCTGCGC	5100
	CCATGGGTTG GCCACCATGC GCCCTAGGCC TCTTTTGTG TTGTTCTCT TGTTCCTG	5160
	TATGTTGCCC GCGCCACCGA CCGGTGAGCC GTCTGGCCGC CGTCGTGGGC GGCGCAGCGG	5220
30	CGGTACCGGC GGTGGTTCT GGGGTGACCG GGTTGATTCT CAGCCCTTCG CAATCCCCTA	5280
	TATTCATCCA ACCAACCCCT TTGCCCCAGA CGTTGCCGCT GCGTCCGGGT CTGGACCTCG	5340
35	CCTTCGCCAA CCAGCCCGGC CACTTGGCTC CACTTGGCGA GATCAGGCC AGCGCCCTC	5400
	CGCTGCCTCC CGTCGCCGAC CTGCCACAGC CGGGGCTGCG GCGCTGACGG CTGTGGCGCC	5460
40	TGCCCATGAC ACCTCACCCG TCCCGGACGT TGATTCTCGC GGTGCAATC TACGCCGCA	5520
	GTATAATTTG TCTACTTCAC CCCTGACATC CTCTGTGGCC TCTGGCACTA ATTAGTCTT	5580
	GTATGCAGCC CCCCTTAATC CGCCTCTGCC GCTGCAGGAC GGTACTAATA CTCACATTAT	5640
45	GGCCACAGAG GCCTCCAATT ATGCACAGTA CCGGGTTGCC CGCGCTACTA TCCGTTACCG	5700
	GCCCCTAGTG CCAATGCAG TTGGAGGCTA TGCTATATCC ATTTCTTTCT GGCTCAAAC	5760
50	AACCACAACC CTAACATCTG TTGACATGAA TTCCATTACT TCCACTGATG TCAGGATTCT	5820
	TGTTCAACCT GGCATAGCAT CTGAATTGGT CATCCCAAGC GAGCGCCTTC ACTACGCAA	5880
	TCAAGGTTGG CGCTCGGTTG AGACATCTGG TGTGCTGAG GAGGAAGCCA CCTCCGGTCT	5940
55	TGTCATGTTA TGCATACATG GCTCTCCAGT TAACTCCTAT ACCAATACCC CTTATACCGG	6000

	TGCCCTTGGC TACTGGACT TTGCCTAGA GCTTGAGTTT CGCAATCTCA CCACCTGTAA	6060
	CACCAATACA CGTGTGTCCC GTTACTCCAG CACTGCTCGT CACTCCGCCC GAGGGGCCGA	6120
5	CGGGACTGCG GAGGTGACCA CAAGTGCAGC CACCAGGTTT ATGAAAGATC TCCACTTTAC	6180
	CGGCCTTAAT GGGGTAGGTG AAGTCGCGG CGGGATAGCT CTAACATTAC TTAACCTTGC	6240
10	TGACACGCTC CTCGGCGGGC TCCGACAGA ATTAATTTCT TCGGCTGGCG GGCAACTGTT	6300
	TTATTCGCG CGGTTGTCT CAGCCATGG CGAGCCAACC GTGAAGCTCT ATACATCAGT	6360
	GGAGAATGCT CAGCAGGATA AGGTTGTTC TATCCCCAC GATATCGATC TTGGTGATTC	6420
15	GCGTGTGGTC ATTGAGGATT ATGACAACCA GCATGAGCAG GATCGGCCCA CCCCCTCGCC	6480
	TGCGCCATCT CGGCCTTTT CTGTTCTCG AGCAATGAT GTACTTTGGC TGCCCTCAC	6540
	TGCAGCCGAG TATGACCACT CCACTTACGG GTCGTCAACT GGCCCGGTTT ATATCTCGGA	6600
20	CAGCGTGACT TTGGTGAATG TTGGGACTGG CGCGCAGGCC GTAGCCCGAT CGCTTGACTG	6660
	GTCCAAAGTC ACCCTCGAGG GCGGGCCCT CCCGACTGTT GAGCAATATT CCAAGACATT	6720
25	CTTTGTGCTC CCCCTTCGTG GCAAGCTCTC CTTTGGGAG GCCGGCACAA CAAAGCAGG	6780
	TTATCCTTAT AATTATAATA CTACTGCTAG TGACCAAGATT CTGATTGAAA ATGCTGCCGG	6840
	CCATCGGGTC GCCATTTCAA CCTATACCAC CAGGCTTGGG GCCGGTCCGG TCGCCATTTT	6900
30	TGCGGCCGCG GTTTTGGCTC CACGCTCCGC CCTGGCTCTG CTGGAGGATA CTTTGGATTA	6960
	TCCGGGGCGG GCGCACACAT TTGATGACTT CTGCCCTGAA TGCCGCGCTT TAGGCCTCCA	7020
35	GGGTTGTGCT TTCCAGTCAA CTGTGCTGA GCTCCAGCGC CTTAAAGTTA AGGTGGGTAA	7080
	AACTCGGGAG TTGTAGTTTA TTTGGCTGTG CCCACCTACT TATATCTGCT GATTTCTTTT	7140
40	ATTTCTTTT TCTGGTCCC GCGCTCCCTG A	7171
	or a fifth sequence (SEQ ID NO.12):	
	CGGGCCCCGT ACAGGTCACA ACCTGTGAGT GTACGAGCT AGTGGAGGCC ATGGTCGAGA	60
45	AAGGCCAGGA TGGCTCCGCC GTCTTTAGC TGATCTCTG CAACCGTGAC GTGTCCAGGA	120
	TCACCTTTT CCAGAAAGAT TGCAATAAGT TCAACAGGG AGAGACCATC GCCCATGGTA	180
	AAGTGGGCCA GGGCATTTCT GCTGGAGTA AGACCTTCTG TGCCCTTTTC GGCCCTGGT	240
50	TCCGTGCTAT TGAGAAGGCT ATTCTGGCCC TGCTCCCTCA GGGTGTGTTT TATGGGGATG	300
	CCTTTGATGA CACCGTCTTC TGGGCGCTG TGGCCGAGC AAAGGCGTCC ATGGTGTGTTG	360
55	AGAATGACTT TTCTGAGTTT GACTGCACCC AGAATAATTT TTCCCTGGGC CTAGAGTGTG	420
	CTATTATGGA GAAGTGTGGG ATGCGAAGT GGTCATCCG CTTGTACCAC CTTATAAGGT	480

CTGCGTGGAT CCTGCAGGCC CCGAAGGAGT CCCTGCGAGG GTGTTGGAAG AAACACTCCG 540
 GTGAGCCCGG CACTCTTCTA TGAATACTG TCTGGAACAT GGCCGTTATC ACCCATTGTT 600
 5 ACGATTTCGG CGATTTCGAG GTGGCTGCCT TTAAAGGTGA TGATTCGATA GTGCTTTGCA 660
 GTGAGTACCG TCAGAGTCCA GGGGCTGCTG TCCTGATTGC TGGCTGTGGC TTAAAGCTGA 720
 10 AGGTGGGTTT CCGTCCGATT GGTTCGTATG CAGGTGTTGT GGTGACCCCC GGCCCTGGCG 780
 CGCTTCCCGA CGTCGTGGGC TTGTCCGGCC GGCTTACTGA GAAGAATTGG GGCCCTGGCC 840
 CTGAGCGGGC GGAGCAGCTC CGCCTTGCTG TGCG 874

15
 or a sequence complementary thereto.

4. A protein which is (a) immunoreactive with
 antibodies present in individuals infected with
 20 enterically transmitted nonA/nonB hepatitis and (b)
 derived from a viral hepatitis agent whose genome
 contains a region which is homologous to the 1.33 kb
 DNA EcoRI insert present in plasmid pTZXF1(ET1.1)
 carried in E. coli strain BB4, and having ATCC
 25 Deposit Nno. 67717.

5. The protein of claim 4, which is encoded by
 a coding region within said 1.33 kb EcoRI insert.

30 6. A protein which is (a) immunoreactive with
 antibodies present in individuals infected with
 enterically transmitted nonA/nonB hepatitis and (b)
 encoded by genetic sequence 406.3-2 or 406.4-2 or a
 fragment thereof.

35 7. A method of detecting infection by
 enterically transmitted nonA/nonB hepatitis viral
 agent in a test individual, comprising:
 providing a peptide antigen which is (a)
 40 immunoreactive with antibodies present in individuals
 infected with enterically transmitted nonA/nonB
 hepatitis and (b) derived from a viral hepatitis agent
 whose genome contains a region which is homologous to

the 1.33 kb DNA EcoRI insert present in plasmid pTZKF1(ET1.1) carried in E. coli strain BB4, and having ATCC deposit no. 67717,

5 reacting serum from the test individual with such antigen, and
 examining the antigen for the presence of bound antibody.

8. The method of claim 7, wherein the serum
10 antibody is an IgM or IgG antibody, or a mixture of both, the antigen provided is attached to a support, said reacting includes contacting such serum with the support and said examining includes reacting the support and bound serum antibody with a reporter-
15 labeled anti-human antibody.

9. A kit for ascertaining the presence of serum
 antibodies which are diagnostic of enterically
 transmitted nonA/nonB hepatitis infection, comprising
20 a support with surface-bound recombinant peptide antigen which is (a) immunoreactive with antibodies present in individuals infected with enterically transmitted nonA/nonB viral hepatitis agent and (b) derived from a viral hepatitis agent
25 whose genome contains a region which is homologous to the 1.33 kb DNA EcoRI insert present in plasmid pTZKF1(ET1.1) carried in E. coli strain BB4, and having ATCC deposit no. 67717, and
 a reporter-labeled anti-human antibody.

30 10. A DNA fragment derived from an enterically transmitted nonA/nonB viral hepatitis agent whose genome contains a region which is homologous to the 1.33 kb DNA EcoRI insert present in plasmid
35 pTZKF1(ET1.1) carried in E. coli strain BB4 and having ATCC deposit no. 67717.

11. The fragment of claim 10, which is derived from said 1.33 kb EcoRI insert.

12. A DNA molecule comprising genetic sequence 406.3-2 or 406.4-2 or a fragment thereof, wherein said fragment comprises at least 12 consecutive nucleotides.

13. A DNA fragment derived from an enterically transmitted nonA/nonB viral hepatitis agent whose genome contains a region which is homologous to a DNA fragment within a first sequence (SEQ ID NO.1):

	AGACCTGTCC CTGTTGCAGC TGTTCACCA CCCTGCCCCG AGCTCGAACA GGGCCTTCTC	60
15	TACCTGCCCC AGGAGCTCAC CACCTGTGAT AGTGTCGTAA CATTGAATT AACAGACATT	120
	GTGCACTGCC GCATGGCCGC CCCGAGCCAG CGCAAGGCCG TGCTGTCCAC ACTCGTGGGC	180
	CGCTACGGCG GTCGCACAAA GCTCTACAAT GCTTCCCACT CTGATGTTTG CCACTCTCTC	240
20	GCCCGTTTTA TCCCGGCCAT TGGCQCCGTA CAGGTTACAA CTTGTGAATT GTACGAGCTA	300
	GTGGAGGCCA TGGTCGAGAA GGGCCAGGAT GGCTCCGCCG TCCTTGAGCT TGATCTTTGC	360
25	AACCGTGACG TGTCAGGAT CACCTTETTC CAGAAAGATT GTAACAAGTT CACCACAGGT	420
	GAGACCATTG CCCATGGTAA AGTGGCCAG GGCATCTCGG CCTGGAGCAA GACCTTCTGC	480
	GCCCTCTTTG GCCCTTGGTT CCGCGCTATT GAGAAGGCTA TTCTGGCCCT GCTCCCTCAG	540
30	GGTGTGTTTT ACGGTGATGC CTTTGATGAC ACCGTCTTCT CGGCGGCTGT GGCCGCAGCA	600
	AAGGCATCCA TGGTGTGGA GAATGACTTT TCTGAGTTTG ACTCCACCCA GAATACTTT	660
35	TCTCTGGGTC TAGAGTGTGC TATTATGGAG GAGTGTGGGA TGCCGCAGTG GTCATCCGC	720
	CTGTATCACC TTATAAGGTC TGCCTGGATC TTGCAGGCCG CGAAGGAGTC TCTGCGAGGG	780
	TTTTGGAAGA AACACTCCGG TGAGCCCGGC ACTCTTCTAT GGAATACTGT CTGGAATATG	840
40	GCCGTTATTA CCCACTGTGA TGACTCCGC GATTTTCAGG TGGCTGCCTT TAAAGGTGAT	900
	GATTCGATAG TGCTTTGCAG TGAGTATCGT CAGAGTCCAG GAGCTGCTGT CCTGATCGCC	960
45	GGCTGTGGCT TGAAGTTGAA GGTAGATTTT CGCCCGATCG GTTTGTATGC AGGTGTTGTG	1020
	GTGGCCCCCG GCCTTGGCGC GCTCCCTGAT GTTGTGCGCT TCGCCGGCCG GCTTACCGAG	1080
50	AAGAATTGGG GCCCTGGCCC TGAGCGGGCG GAGCAGCTCC GCCTCGCTGT TAGTGATTTT	1140

CTCCGCAAGC TCACGAATGT AGGTGAGATG TGTGTGATG TTGTTTCCCG TGTTTATGGG 1200

GTTTCCCCTG GACTCGTTCA TAACCTGATT GGCATGCTAC AGGCTGTTGC TGATGGCAAG 1260

5 GCACATTTCA CTGAGTCAGT AAAACCAATG CTGGA 1295

a second sequence (SEQ ID NO.5):

TCGAGCACTG GTTTTACTGA CTCAGTGAAT TGTGCTTGC CATCAGCAAC AGCCTGTAGC 60

10 ATGCCAATCA GGTATGAAC GAGTCCAGG GAAACCCCAT AAACACGGGA AACAACATCC 120

ACACACATCT GAGTACATT CGTGAATTT GGAAGGAAT CACTAACAGC GAGGCGGAGC 180

TGCTCCGCCG GTCAGGGCC AGGGCCCAA TTCTCTCGG TAAGCCGGCC GGCGAAGCGC 240

15 ACAACATCAG GGAGCGGCC AAGGCCGGG GCAACCAAA CACCTGCATA CAAACCGATC 300

GGGCGGAAAT CTACCTTCAA CTCAAGCCA GAGCGGGGA TCAGGACAGC AGCTCCTGGA 360

20 CTCTGACGAT ACTCACTGCA AAGCACTATC GAATCATAC CTTTAAAGGC AGCCACCTGA 420

AAATCGCGGA AGTCATAACA GTGGGTAATA ACGGCATAT TCCAGACAGT ATTCCATAGA 480

AGAGTGCCGG GTCACCGGA GTGTTCTTC CAAACCTTC GCAGAGACTC CTTCGGGGCC 540

25 TGCAAGATCC ACGCAGACCT TATAAGGTGA TACAGGGGA TGAGCCACTG CGGCATCCCA 600

CACTCCTCCA TAATAGCACA CTCTAGACCC AGAGAAAAGT TATTCTGGGT GGAGTCAAAC 660

30 TCAGAAAAGT CATTCTCAA CACCATGGAT GCCTTTGCTG CGGCCACAGC CGCCGAGAAG 720

ACGGTGTCAT CAAAGGCATC ACCGTAAAC ACACCTGAG GGAGCAGGGC CAGAATAGCC 780

TTCTCAATAG CGCGAACCA AGGGCCAAAG AGGGCGCAGA AGGTCTTGCT CCAGGCCGAG 840

35 ATGCCCTGGC CCACTTTACC ATGGCAATG GTCTCACCTG TGGTGAACCT GTTACAATCT 900

TTCTGGAAGA AGGTGATCCT GGACACGTCA CGGTTGCAA GATCAAGCTC AAGGACGGCG 960

40 GAGCCATCCT GGCCCTTCTC GACCATGGCC TCCACTAGCT CGTACAATC ACAAGTTGTA 1020

ACCTGTACGG GGCAATGGC CGGATAAAA CGGGCGAGAG AGTCGGAAC ATCAGAGTGG 1080

GAAGCATTGT AGAGCTTTGT GCGACCGCC TAGCGGCCA CGAGTGTTGA CAGCAGGGCC 1140

45 TTGCGCTGGC TCGGGCGGC CATGCGCAG TGCACAATGT CTGTTAATC AAATGTTACG 1200

ACACTATCAC AGGTGGTGAG CTCCTGGGG AGGTAGAGAA GGCCCTGTT CAGCTCGGGG 1260

50 CAGGGTGGTA GAACAGCTG AACAGGGACA GGTCT 1295

a third sequence (SEQ ID NO.6):

AGGCAGACCA CATATGTGGT CGATGCC ATGGAGGCC ATCAGTTTAT TAAGGCTCCT 57

55 GGCATCACTA CTGCTATTGA GCAGGCTGCT CTAGCAGCG CCAACTCTGC CCTGGCGAAT 117

	GCTGTGGTAG TTAGGCTTT TCTCTCTAC GAGCAGATTG AGATCCTCAT TAACCTAATG	177
	CAACCTCGCC AGCTTGTTTT CGGCGCGAG GTTTTCTGGA ATCATCCCAT CCAGCGTGC	237
5	ATCCATAACG AGCTGBAGCT TTACTGCGC GCGCGCTCG GCGGTGTCT TGAAATTGGC	297
	GCCCATCCCC GGTCAATAAA TGATAATGCT AATGTGGTCC ACCGCTGCTT CCTCCGCCCT	357
10	GTTGGGCGTG ATGTTGAGCG CTGGTATACT GCTCCCACTC GCGGGCCGGC TGCTAATTGC	417
	CGGCGTTCCG CGCTGCGCG GCTTCCCGCT GCTGACCGCA CTTACTGCCT CGACGGGTTT	477
	TCTGGCTGTA ACTTTCCGCG CGAGACTGGC ATCGCCCTCT ACTCCCTTCA TGATATGTCA	537
15	CCATCTGATG TCGCGAGGC CATGTTCCGC CATGGTATGA CGCGGCTCTA TGCCGCCCTC	597
	CATCTTCCGC CTGAGGTCTT GCTGCCCTCT GGCACATATC GCACCGCATC GTATTTGCTA	657
20	ATTCATGACG GTAGGCGCGT TGTGGTGACG TATGAGGGTG ATACTAGTGC TGGTTACAAC	717
	CACGATGTCT CCAACTTGCG CTCCTGGATT AGAACCACCA AGGTTACCGG AGACCATCCC	777
	CTCGTTATCG AGCGGGTTAG GGCCATTGCG TGCCACTTTG TTCTCTTGCT CACGGCAGCC	837
25	CCGAGGCCAT CACCTATGCC TTATGTTCTT TACCCCGGT CTACCGAGGT CTATGTCCGA	897
	TCGATCTTCG GCCCGGGTGG CACCCCTTCC TTATTCCCAA CCTCATGCTC CACTAAGTCG	957
30	ACCTTCCATG CTGTCCCTGC CCATATTTGG GACCGTCTTA TGCTGTTCCG GGCCACCTTG	1017
	GATGACCAAG CCTTTTGCTG CTCCGTTTA ATGACCTACC TTCGCGCAT TAGCTACAAG	1077
	GTCACGTGTT GTACCCCTGT GGCTAATGAA GGCTGGAATG CCTCTGAGGA CGCCCTCACA	1137
35	GCTGTTATCA CTGCCGCTA CCTTACCATT TGCCACCAGC GGTATCTCCG CACCCAGGCT	1197
	ATATCCAAGG GGATGCGTCG TCTGGAACGG GAGCATGCCC AGAAGTTTAT AACACGCCTC	1257
40	TACAGCTGGC TCTTCGAGAA GTCCGGCCGT GATTACATCC CTGGCCGTCA GTTGGAGTTC	1317
	TACGCCAGT GCAGGCGCTG GCTCTCCGC GGCTTTCATC TTGATCCACG GGTGTTGGTT	1377
	TTTGACGAGT CGGCCCTCTG CCATTGTAGG ACCGCGATCC GTAAGGCGCT CTCAAAGTTT	1437
45	TGCTGCTTCA TGAAGTGGCT TGGTCAGGAG TGCACCTGCT TCCTTCAGCC TGCAGAAGGC	1497
	GCCGTCGGCG ACCAGGGTCA TGATAATGAA GCCTATGAGG GGTCCGATGT TGACCCTGCT	1557
50	GAGTCCGCCA TTAGTGACAT ATCTGGGTCC TATGTCGTCC CTGGCACTGC CCTCCAACCG	1617
	CTCTACCAGG CCCTCGATCT CCCCCTGAG ATTGTGGCTC GCGCGGGCCG GCTGACCGCC	1677
	ACAGTAAAGG TCTCCAGGT CGATGGGCGG ATCGATTGCG AGACCCTTCT TGGTAACAAA	1737
55	ACCTTTCGCA CGTCGTTCTG TGACGGGGCG GTCTTAGAGA CCAATGGCCC AGAGCGCCAC	1797

	AATCTCTCCT TGGATGCGAG TCAGATACT ATGGCGGCTG GCCCTTTCAG TCTCACCTAT	1857
	GCCGCCTCTG CAGCTGGGCT GGAGGTGGC TATGTTGCTG CCGGGCTTGA CCATCGGGCG	1917
5	GTTTTTGCCC CCGGTGTTG ACCCGGTGA GCGCCGGCG AGGTTACCGC CTTCTGCTCT	1977
	GCCCTATACA GGTAAAGCG TGAGGCGCG CGCATTCGC TGATCGGTAA CTTATGGTTC	2037
10	CATCCTGAGG GACTCATGG CCTCTTGGC CGTTTTTGC CCGGGCATGT TTGGGAGTCG	2097
	GCTAATCCAT TGTGTGGGA GAGCAGCTT TACACCGTA CTTGGTCGGA GGTGATGCC	2157
15	GTCTCTAGTC CAGCCCGGC TGACTAGGT TTTATGTCTG AGCCTTCTAT ACCTAGTAGG	2217
	GCCGCCACGC CTACCTGGC GCGCGCTGA CCGCCCGCTG CACCGGACCC TTCCCCCCT	2277
	CCCTCTGCC CCGCGCTTGC TGAGCGGCT TGTGGCGTA CCGCCGGGC CCCGGCCATA	2337
20	ACTCACCAGA CCGCCCGGA CCGCGGCTG CTCTTCACCT ACCCGGATGG CTCTAAGGTA	2397
	TTGCCCGCT CGCTGTTGA GTGACATGC ACGTGGCTG TTAACGCGTC TAATGTTGAC	2457
	CACCGCCCTG GCGGGGGCT TTGCCATGA TTTTACCAA GGTACCCGC CTCCTTTGAT	2517
25	GCTGCCTCTT TTGTGATGG CGACGGGCG GCGCGTACA CACTAACCC CCGGCCAATA	2577
	ATTCACGCTG TCGCCCTGA TTATAGGTTG GAACATAACC CAAAGAGGCT TGAGGCTGCT	2637
30	TATCGGGAAT CTTGCTCCG CCTCGGCACC GCTGCATACC CGCTCCTCGG GACCGGCATA	2697
	TACCAGGTGC CGATCGGCC CAGTTTTGAC GCCTGGGAGC GGAACACCG CCGCGGGAT	2757
	GAGTTGTACC TTCCTGAGCT TGCTGCCAGA TGGTTTGAG CCAATAGGC GACCCGCCG	2817
35	ACTCTACTA TAACTGAGGA TGTGACGG ACAGCGAATC TGGCCATGA GCTTGACTCA	2877
	GCCACAGATG TCGCCGGGC CTGTGCCGC TGTGGGTCA CCGCGGCGT TGTTCACTAC	2937
40	CAGTTTACTG CAGGTGTGCC TGGATCGGC AAGTCCGCT CTATACCCA AGCCGATGTG	2997
	GACGTTGTCG TGGTCCGAC GCGTGAGTG CGTAATGCT GCGCGGCTG CCGCTTTGCT	3057
	GCTTTTACCC CGCATACTG CGCCAGAGT ACCCAGGGC GCGGGTTGT CATTGATGAG	3117
45	GCTCCATCCC TCCCCCTCA CCTGCTGCTG CTCCACATG AGCGGGCCG CACCGTCCAC	3177
	CTTCTTGGC ACCCGAACCA GATCCAGCC ATCGACTTG AGCACGCTG GCTCGTCCC	3237
50	GCCATCAGG CCGACTTAGG CCCCACCTC TGGTGGCATG TTACCCATG CTGGCCTGCG	3297
	GATGTATGCG AGCTCATCG TGGTGATAC CCCATGATC AGACCACTAG CCGGGTTCTC	3357
	CGTTCGTTGT TCTGGGGTA GCCTGCCGT GGGCAGAAAC TAGTGTTCAC CCAGGCGGCC	3417
55	AAGCCCGCA ACCCGGCTC AGTGAGGTC CACGAGGCG AGGGCGCTAC CTACACGGAG	3477

	ACCACTATTA TTGGACAGC AGATGCGCG GGCCTTATTC AGTCGTCTCG GGCTCATGCC	3537
5	ATTGTTGCTC TGACGCGCCA CACTGAGAAG TGCGTCATCA TTGACGCACC AGGCCTGCTT	3597
	CGCGAGGTGG GCATCTCCGA TGCAATCGTT AATAACTTTT TCCTCGCTGG TGGCGAAATT	3657
	GGTCACCAGC GCCCATCAGT TATTCGCCST GGCAACCCCTG ACGCCAATGT TGACACCCTG	3717
10	GCTGCCTTCC CGCGTCTTG CCAGATTAGT GCCTTCCATC AGTTGGCTGA GGAGCTTGGC	3777
	CACAGACCTG TCCTGTGTGC AGCTGTTCTA CCACCCCTGCC CCGAGCTCGA ACAGGGCCTT	3837
15	CTCTACCTGC CCCAGGAGCT CACCACCTGT GATAGTGTG TAACATTTGA ATTAACAGAC	3897
	ATTGTGCACT GCCGCATGGC CGCCCCGAGC CAGCGCAAGG CCGTGCTGTC CACACTCGTG	3957
	GGCCGCTACG GCGGTGCGAC AAAGCTCTAC AATGCTTCCC ACTCTGATGT TCGCGACTCT	4017
20	CTCGCCCGTT TTATCCCGGC CATTGGCCCC GTACAGGTTA CAACTTGTA ATTGTACGAG	4077
	CTAGTGGAGG CCATGGTCGA GAAGGGCCAG GATGGCTCCG CCGTCCTTGA GCTTGATCTT	4137
25	TGCAACCGTG ACGTGTCCAG GATCACCTTC TTCCAGAAAG ATTGTAACAA GTTCACCACA	4197
	GGTGAGACCA TTGCCCATGG TAAAGTGGGC CAGGGCATCT CGGCCTGGAG CAAGACCTTC	4257
	TGCGCCCTCT TTGGCCCTTG GTTCGCGCT ATTGAGAAGG CTATTCTGGC CCTGCTCCCT	4317
30	CAGGGTGTGT TTTACGGTGA TGCTTTGAT GACACCGTCT TCTCGGCGGC TGTGGCCGCA	4377
	GCAAAGGCAT CCATGGTGTG TGAGAATGAC TTTTCTGAGT TTGACTCCAC CCAGAATAAC	4437
35	TTTTCTCTGG GTCTAGAGTG TGCTATTATG GAGGAGGTG GGATGCCGCA GTGGCTCATC	4497
	CGCTGTATC ACCTTATAAG GTCTGCGTGG ATCTTGCAAG CCCCGAAGGA GTCTCTGCGA	4557
	GGGTTTTGGA AGAAACACTC CGGTGAGCCC GGCACCTTC TATGGAATAC TGTCTGGAAT	4617
40	ATGGCCGTTA TTACCCACTG TTATGACTTC CGCGATTTTC AGGTGGCTGC CTTTAAAGGT	4677
	GATGATTCGA TAGTGCTTG CAGTGAGTAT CGTCAGAGTC CAGGAGCTGC TGTCTGATC	4737
45	GCCGGCTGTG GCTTGAAGTT GAAGGTAGAT TTCCGCCCGA TCGGTTTGTA TGCAGGTGTT	4797
	GTGGTGGCCC CCGGCCTTGG CGCGCTCCCT GATGTTGTGC GCTTCGCCGG CCGGCTTACC	4857
	GAGAAGAATT GGGGCCCTGG CCCTGAGCGG GCGGAGCAGC TCCGCCTCGC TGTTAGTGAT	4917
50	TTCTCCGCA AGCTCACGAA TGTAAGTCAG ATGTGTGTGG ATGTTGTTTC CCGTGTATTAT	4977
	GGGGTTTCCC CTGGAATCGT TCATAACCTG ATTGGCATGC TACAGGCTGT TGCTGATGGC	5037
55	AAGGCACATT TCACTGAGTC AGTAAACCA GTGCTCGACT TGACAAATTC AATCTTGTGT	5097
	CGGGTGAAT GA ATAACATGTC TTTTGCTGCG CCCATGGGTT CGCGACCATG	5149

	CGCCCTCGGC CTATTTGTT GGTGTCTCTC ATGTTTTGC CTATGCTGCC CGCGCCACCG	5209
5	CCCGGTCAAG CGTCTGGCG GGTGTGGG CGGCGCAGCG GCGGTTCCCG CGGTGGTTTC	5269
	TGGGGTGACC GGGTTGATC TCAGGCTTC GCAATGCGCT ATATTCAATC AACCAACCCC	5329
	TTCGCCCCCG ATGTACCGG TGGGGCGGG GGTGGACCTC GTGTTGCCA ACCCGCCCGA	5389
10	CCACTCGGCT CGGTTGGCG TGACGAGGC CAGCGCCCCG CCGTTGCCTC ACGTCGTAGA	5449
	CCTACCACAG CTGGGGCGCG GCGGCTAA CCGGGGTGCG TCGGGCCCAT GACACCCCGC	5507
15	CAGTGCTGA TGTGACTCC CGCGGGCGCA TCTTGGCGCG GCAGTATAAC CTATCAACAT	5567
	CTCCCCCTAC CTCTTCGTG GCCACGGCGA CTAACCTGGT TCTTTATGCC GCCCCTCTTA	5627
	GTCCGCTTTT ACCCCTTCAG GACGGCACCA ATACCCATAT AATGGCCACG GAAGCTTCTA	5687
20	ATTATGCCCA GTACCGGGT GCCCGTGCCA CAATCCGTTA CCGCCCGCTG GTCCCCAATG	5747
	CTGTGGGCGG TTACGCCATC TCCATCTCAT TCTGGCCACA GACCACCACC ACCCGACGT	5807
25	CCGTTGATAT GAATCAATA ACCTCGACGG ATGTTGCTAT TTAGTCCAG CCCGGCATAG	5867
	CCTCTGAGCT TGTGATCCA AGTGAGCGCC TACACTATCG TAACCAAGGC TGGCGCTCCG	5927
	TCGAGACCTC TGGGGTGGCT GAGGAGGAGG CTACCTCTGG TCTTGTATG CTTTGCATAC	5987
30	ATGGCTCACT CGTAAATTC TATACTAATA CACCTATAC CCGTGCCCTC GGGCTGTTGG	6047
	ACTTTGCCCT TGAGCTTGAG TTTCGCAACC TTACCCCGG TAACCAAT ACGGGGTCT	6107
35	CCCGTTATC CAGCACTGCT CGCCACCGC TTCGTCGCGG TCGGACGGG ACTGCCGAGC	6167
	TCACCACCAC GGCTGCTACC CGCTTTATGA AGGACCTCTA TTTTACTAGT ACTAATGGTG	6227
	TCGGTGAGAT CGGCCGCGG ATAGCCTCA CCTGTTCAA CCTTGCTGAC ACTCTGCTTG	6287
40	GCGGCCTGCC GACAGAATTG ATTTGTCGG CTGGTGGCCA GCTGTTCTAC TCCCGTCCCG	6347
	TTGTCTCAGC CAATGGCGAG CCGACTGTTA AGTTGTATAC ATCTGTAGAG AATGCTCAGC	6407
45	AGGATAAGGG TATTGCAATC CGCATGACA TTGACCTCGG AGAATCTCGT GTGGTTATTC	6467
	AGGATTATGA TAACCAACAT GAACAAGATC GGCCGACGCC TTCTCCAGCC CCATCGCGCC	6527
	CTTTCTCTGT CTTTCGAGCT AATGATGTG TTTGGCTCTC TCTACCGCT GCCGAGTATG	6587
50	ACCAGTCCAC TTATGGCTCT TCGACTGGCC CAGTTTATGT TTCTGACTCT GTGACCTTGG	6647
	TTAATGTTGC GACCGGCGCG CAGGCGTTG CCCGGTCGCT CGATTGGACC AAGGTCACAC	6707
55	TTGACGGTCG CCCCCTCTCC ACCATCAGC AGTACTCGAA GACCTTCTTT GTCCTGCCGC	6767
	TCCGCGGTAA GCTCTCTTC TGGGAGGCG GCACAACTAA AGCCGGGTAC CTTATAATT	6827

	ATAACACCAC TGCTAGCGAC CAACTGCTTG TCGAGAATGC CGCCGGGCAC CGGGTCGCTA	6887
	TTTCCACTTA CACCACTAGC CTGGGTGCTG GTCCCGTCTC CATTCTGCG GTTGCCGTTT	6947
5	TAGCCCCCA CTGTGCGTA GCATTGCTTG AGGATACCTT GGACTIONCT GCCCGCGCCC	7007
	ATACTTTTGA TGATTCTGC CCAGAGTGC GCCCCTTGG CCTTCAGGGC TGCCTTTTC	7067
10	AGTCTACTGT CGGTGAGCTT CAGCGCCTTA AGATGAAGGT GGGTAAACT CGGGAGTTGT	7127
	AG TTTATTTGCT TGTGCCCCC TTCTTCTGT TGCTTATTC TCATTTCTGC	7179
	GTTCCGCGCT CCTGA	7195

15
a fourth sequence (SEQ ID NO.10):

	GCCATGGAGG CCCACCAGTT CATTAGGCT CCTGGCATCA CTACTGCTAT TGAGCAAGCA	60
	GCTCTAGCAG CGGCCAACTC CGCCCTTGG AATGCTGTGG TGGTCCGGCC TTTCTTTTC	120
20	CATCAGCAGG TTGAGATCCT TATAAATCTC ATGCAACCTC GGCAGCTGGT GTTTCGTCCT	180
	GAGGTTTTTT GGAATCACCC GATTCAACGT GTTATACATA ATGAGCTTGA GCAGTATTGC	240
25	CGTGCTCGCT CGGGTCGCTG CCTTGAGATT GGAGCCCACC CACGCTCCAT TAATGATAAT	300
	CCTAATGTCC TCCATCGCTG CTTTCTCCAC CCCGTCGGCC GGGATGTTCA GCGCTGGTAC	360
	ACAGCCCCGA CTAGGGGACC TGCGGCGAAC TGTGCGCGCT CGGCACTTCG TGGTCTGCCA	420
30	CCAGCCGACC GCACTTACTG TTTGATGGC TTTGCCGGCT GCCGTTTTGC CGCCGAGACT	480
	GGTGTGGCTC TCTATTCTCT CCATGACTTG CAGCCGGCTG ATGTTGCCGA GGCATGGCT	540
35	CGCCACGGCA TGACCCGCCT TTATGCAGCT TTCCACTTGC CTCCAGAGGT GTCCTGCCT	600
	CCTGGCACCT ACCGGACATC ATCCTACTTG CTGATCCACG ATGGTAAGCG CGCGGTTGTC	660
	ACTTATGAGG GTGACACTAG CGCCGGTTAC AATCATGATG TTGCCACCCT CCGCACATGG	720
40	ATCAGGACAA CTAAGTTGT GGGTGAACAC CCTTTGGTGA TCGAGCGGT GCGGGGTATT	780
	GGCTGTCACT TTGTGTTGTT GATCACTGCG GCCCTGAGC CCTCCCCGAT GCCCTACGTT	840
45	CCTTACCCGC GTTCGACGGA GGTCTATGTC CGGTCTATCT TTGGGCCCGG CGGGTCCCCG	900
	TCGTGTTCC CGACCGCTTG TGCTGTCAAG TCCACTTTTC ACGCCGTCCC CACGCACATC	960
	TGGGACCGTC TCATGCTCTT TGGGGCCACC CTCGACGACC AGGCCTTTTG CTGCTCCAGG	1020
50	CTTATGACGT ACCTTCGTGG CATTAGCTAT AAGGTAAGTG TGGGTGCCCT GGTGCTAAT	1080
	GAAGGCTGGA ATGCCACGA GGATGCGCTC ACTGCAGTTA TTACGGCGGC TTACCTCACA	1140
55	ATATGTCATC AGCGTTATTT GCGGACCCAG GCGATTTCTA AGGGCATGCG CCGGCTTGAG	1200

	CTTGAACATG CTCTGAAATT TATTTCATTC CTCTACAGCT GGCTATTTGA GAAGTCAGGT	1260
	CGTGATTACA TCCCAGGCCG CCAGCTGAG TTCTACGCTC AGTGCCGCCG CTGGTTATCT	1320
5	GCCGGGTTCC ATCTCGACCC CCGCAGCTTA GTTTTGATG AGTCAGTGCC TTGTAGCTGC	1380
	CGAACCACCA TCCGGGGGAT CGCTGAAAAA TTTGCTGTT TTATGAAGTG GCTCGGTCAG	1440
10	GAGTGTCTT GTTTCCTCCA GCGCGGAG GGGCTGGCG GCGACCAAGG TCATGACAAT	1500
	GAGGCCTATG AAGGCTCTGA TGTGATCT GTGAGGCTG CCACCTAGA CATTACAGGC	1560
	TCATACATCG TGGATGGTGG GTCTCTGAA ACTGTCTATC AAGCTCTCGA CCTGCCAGCT	1620
15	GACCTGGTAG CTCGGGAGC CCGACTCTCT GTACAGTTA CTGTTACTGA AACCTCTGGC	1680
	CGTCTGGATT GCCAAACAAT GTGGGAAT AAGCTTTTTT TCACTACCTT TGTTGATGGG	1740
20	GCACGCCTTG AGGTTAAGCG GCGTGAAGC CTTAACCTCT CTTTGGACAG CCAGCAGTGT	1800
	AGTATGGCAG CCGGCCCGTT TTGCTCACC TATGCTGCCG TAGATGGCGG GCTGGAAGTT	1860
	CATTTTTCCA CCGCTGGCCT CGAGAGCGGT GTTGTTTTCC CCCCTGGTAA TGCCCCGACT	1920
25	GCCCCGCCGA GTGAGGTCAC CGCCTCTGC TCAGCTCTTT ATAGGCACAA CCGGCAGAGC	1980
	CAGCGCCAGT CGGTTATTGG TAGTTGTGG CTGCACCCTG AAGGTTTGCT CGGCCTGTTT	2040
30	CCGCCCTTTT CACCCGGGCA TGAGTGGCGG TCTGCTAACC CATTTTGGG CGAGAGCACG	2100
	CTCTACACCC GCACTTGGTC CACAATTACA GACACACCTT TAACTGTCGG GCTAATTTCC	2160
	GGTCAATTGG ATGCTGCTCC CCACTCGGGG GGGCCACCTG CTAAGCCAC AGGCCCTGCT	2220
35	GTAGGCTCGT CTGACTCTCC AGACCTGAC CCGCTACCTG ATGTTACAGA TGGCTACGC	2280
	CCCTCTGGGG CCCGTCCGGC TGGCCCCAAC CCGAATGGCG TTCCGCAGCG CCGCTTACTA	2340
40	CACACCTACC CTGACGGCGC TAAGATCTAT GTCGGCTCCA TTTTCGAGTC TGAGTGCACC	2400
	TGGCTTGTC ACGCATCTAA CGCGGCCAC CGCCTGGTG GCGGGCTTTG TCATGCTTTT	2460
	TTTCAGCGTT ACCCTGATTC GTTTGAGCC ACCAAGTTTG TGATGCGTGA TGGTCTGGC	2520
45	GCGTATACCC TTACACCCCG GCGATCATT CATGCGGTGG CCCCAGCTA TCGATTGGAA	2580
	CATAACCCCA AGAGGCTCGA GGCTGCCTAC CGGAGACTT GCGCCGCCG AGGCACTGCT	2640
50	GCCTATCCAC TCTTAGGCGC TGGCATTTAC CAGGTGCCTG TTAGTTTGAG TTTTGATGCC	2700
	TGGGAGCGGA ACCACGCCC GTTTGACGAG CTTTACCTAA CAGAGCTGGC GGCTCGGTGG	2760
	TTTGAATCCA ACCGCCCCG TCAGCCACG TTGAACATAA CTGAGGATAC CGCCGTGCG	2820
55	GCCAACCTGG CCTGGAGCT TGAATCGGG AGTGAAGTAG GCCGCGCATG TGCCGGGTGT	2880

	AAAGTCGAGC CTGGCGTTGT GCGGTATCAG TTACAGCCG GTGTCCCCGG CTCTGGCAAG	2940
	TCAAAGTCCG TGCAACAGGC GGATGTGSAT GTTGTGTGTG TGCCCACTCG CGAGCTTCGG	3000
5	AACGCTTGGC GGCGCGGGG GTTTCGGCA TTAACCTCCG AACTGCGGC CCGTGTCACT	3060
	AGCGGCCGTA GGGTGTGAT TGATGAGGC CTTTCGCTCC CCCCACACTT GCTGCTTTTA	3120
10	CATATGCAGC GTGCTGCATC TGTGCACCTC CTGGGGGACC CGAATCAGAT CCCC GCCATA	3180
	GATTTTGAGC ACACCGGTCT GATTTCAGCA ATACGGCCGG AGTTGGTCCC GACTTCATGG	3240
	TGGCATGTCA CCCACCGTTG CCCTGCAGAT GTCTGTGAGT TAGTCCGTGG TGCTTACCCT	3300
15	AAAATCCAGA CTACAAGTAA GGTGCTCCGT TCCCTTTTCT GGGGAGAGCC AGCTGTCGGC	3360
	CAGAAGCTAG TGTTACACA GGCTGCTAAG GCCGCGCACC CCGGATCTAT AACGGTCCAT	3420
20	GAGGCCCAGG GTGCCACTTT TACCACTACA ACTATAATTG CAACTGCAGA TGCCCGTGGC	3480
	CTCATACAGT CCTCCCGGGC TCACGCTATA GTTGCTCTCA CTAGGCATAC TGAAAAATGT	3540
	GTTATACTTG ACTCTCCCGG CCTGTTGCGT GAGGTGGGTA TCTCAGATGC CATTGTTAAT	3600
25	AATTTCTTCC TTTCCGGTGG CGAGGTTGGT CACCAGAGAC CATCGGTCAT TCCGCGAGGC	3660
	AACCCTGACC GCAATGTTGA CGTGCTTGGC GCGTTTCCAC CTTCATGCCA AATAAGCGCC	3720
30	TTCCATCAGC TTGCTGAGGA GCTGGGCCAC CGGCCGGCGC CGGTGGCGGC TGTGCTACCT	3780
	CCCTGCCCTG AGCTTGAGCA GGGCCTTCTC TATCTGCCAC AGGAGCTAGC CTCCTGTGAC	3840
	AGTGTGTGA CATTTGAGCT AACTGACATT GTGCACTGCC GCATGGCGGC CCCTAGCCAA	3900
35	AGGAAAGCTG TTTTGTCCAC GCTGGTAGGC CGGTATGGCA GACGCACAAG GCTTTATGAT	3960
	GCGGGTCACA CCGATGTCCG CGCCTCCCTT GCGCGCTTTA TTCCCACTCT CGGGCGGGTT	4020
40	ACTGCCACCA CCTGTGAACCT CTTTGAGCTT GTAGAGGCGA TGGTGGAGAA GGGCCAAGAC	4080
	GGTTCAGCCG TCCTCGAGTT GGATTTGTGC AGCCGAGATG TCTCCGCAT AACCTTTTTC	4140
	CAGAAGGATT GTAACAAGTT CACGACCGGC GAGACAATTG CGCATGGCAA AGTCGGTCAG	4200
45	GGTATCTTCC GCTGGAGTAA GACGTTTTGT GCCCTGTTTG GCCCCTGGTT CCGTGCGATT	4260
	GAGAAGGCTA TTCTATCCCT TTTACCACAA GCTGTGTTCT ACGGGGATGC TTATGACGAC	4320
50	TCAGTATTCT CTGCTGCCGT GGCTGGCGCC AGCCATGCCA TGGTGTGTTGA AAATGATTTT	4380
	TCTGAGTTTG ACTCGACTCA GAATAACTTT TCCCTAGGTC TTGAGTGCGC CATTATGGAA	4440
	GAGTGTGGTA TGCCCCAGTG GCTTGTCAAG TTGTACCATG CCGTCCGGTC GGC GTGGATC	4500
55	CTGCAGGCCC CAAAAGAGTC TTTGAGAGGG TTCTGGAAGA AGCATTCTGG TGAGCCGGGC	4560

	AGCTTGCTCT GGAATACGGT GTGGAACATG GCAATCATTG CCCATTGCTA TGAGTTCCGG	4620
	GACCTCCAGG TTGCCGCCTT CAAGGGGAG GACTCGGTG TCCTCTGTAG TGAATACCGC	4680
5	CAGAGCCAG GCGCCGGTTC GCTTATAGCA GGCTGTGGT TGAAGTTGAA GGCTGACTTC	4740
	CGGCCGATTG GGCTGTATGC GGGGGTGTG GTGCCCCCGG GGCTCGGGGC CCTACCCGAT	4800
10	GTCGTTGAT TCGCCGAGC GCTTCCGAG AAGAACTGGG GGCTGATCC GGAGCGGGCA	4860
	GAGCAGCTCC GCTCGCGCT GAGGATTTC CTCCTAGGT TAACGAATGT GGCCAGATT	4920
	TGTGTTGAGG TGGTGTCTAG AGTTTACGG GTTCCCCCGG GTCTGGTTCA TAACCTGATA	4980
15	GGCATGCTCC AGACTATTGG TGATGGTAAG GCGCATTTTA CAGAGTCTGT TAAGCCTATA	5040
	CTTGACCTTA CAACTCAAT TATGCACCGG TCTGAATGAA TAACATGTGG TTTGCTGCGC	5100
20	CCATGGGTTT GCCACCATGC GGCCTAGGCC TCTTTTGCTG TTGTTCTCT TGTTCCTGCC	5160
	TATGTTGCCC GCGCCACCGA CCGGTGAGCC GTCTGGCCGC CGTCGTGGGC GGCGCAGCGG	5220
	CGGTACCGGC GGTGGTTTCT GGGGTGACCG GGTGATTCT CAGCCCTTCG CAATCCCCTA	5280
25	TATTCATCCA ACCAACCCTT TTGCCCCAGA CGTTGCCGCT GCGTCCGGGT CTGGACCTCG	5340
	CCTTCGCCAA CCAGCCCGGC CACTTGGCTC CACTTGGCGA GATCAGGCC AGCGCCCTC	5400
30	CGCTGCCTCC CGTCGCCGAC CTGCCACAGC CGGGGCTGCG GCGCTGACGG CTGTGGCGCC	5460
	TGCCCATGAC ACCTACCCG TCCCGACGT TGATTCTCGC GGTGCAATTC TACGCCCCA	5520
	GTATAATTTG TCTACTTAC CCCTGACATC CTCTGTGGCC TCTGGCACTA ATTTAGTCT	5580
35	GTATGCAGCC CCCCTAATC CGCCTCTGCC GCTGCAGGAC GGTACTAATA CTCACATTAT	5640
	GGCCACAGAG GCCTCCAATT ATGCACAGTA CCGGGTTGCC GCGCTACTA TCCGTTACCG	5700
40	GCCCCTAGTG CCTAATGCAG TTGGAGGCTA TGCTATATCC ATTTCTTTCT GGCCTCAAAC	5760
	AACCACAACC CCTACATCTG TTGACATGAA TTCCATTACT TCCACTGATG TCAGGATTCT	5820
	TGTTCAACCT GGCATAGCAT CTGAATTGGT CATCCCAAGC GAGCGCCTTC ACTACCGCAA	5880
45	TCAAGGTTGG CGCTCGGTTG AGACATCTGG TGTGCTGAG GAGGAAGCCA CCTCCGGTCT	5940
	TGTCATGTTA TGCATACATG GCTCTCCAGT TAACTCTAT ACCAATACCC CTTATACCGG	6000
50	TGCCCTTGGC TTA CTGGACT TTGCCTTAGA GCTTGAGTTT CGCAATCTCA CCACCTGTAA	6060
	CACCAATACA CGTGTGTCCC GTTACTCCAG CACTGCTCGT CACTCCGCC GAGGGGCCGA	6120
	CGGGACTGCG GAGCTGACCA CAACTGCAGC CACCAGGTTT ATGAAAGATC TCCACTTTAC	6180
55	CGGCCTTAAT GGGGTAGGTG AAGTCGGCCG CGGGATAGCT CTAACATTAC TTAACCTTGC	6240

	TGACACGCTC CTGGGGGGG TCCGACAG ATTAAATTTG TCGGCTGGCG GGCAACTGTT	6300
	TTATTCGGC CCGTTGTCT CAGCAATGG CGAGCCAACC GTGAAGCTCT ATACATCAGT	6360
5	GGAGAATGCT CAGCAGGATA AGGGTGTGG TATCCCCAC GATATCGATC TTGGTGATTC	6420
	GGGTGTGGT ATTGAGGATT ATGACAAACA GCATGAGCAG GATCGGCCCA CCCCCTCGCC	6480
10	TGCGCCATCT CGGCCTTTT CTGTTCTCG AGCAATGAT GTACTTTGGC TGTCCCTCAC	6540
	TGCAGCCGAG TATGACGAGT CCACTTAGG GTGTCAACT GGCCCGGTTT ATATCTCGGA	6600
	CAGCGTGACT TTGGTGAATG TTGCGACTGG CGCGCAGGCC GTAGCCCGAT CGCTTGACTG	6660
15	GTCCAAAGTC ACCCTCGAGC GGCGGCCCT CCCGACTGTT GAGCAATATT CCAAGACATT	6720
	CTTTGTGCTC CCCCTCGTG GCAAGCTCTC CTTTGGGAG GCCGGCACAA CAAAAGCAGG	6780
20	TTATCCTTAT AATTATAATA CTA CTGCTAG TGACCAGATT CTGATTGAAA ATGCTGCCGG	6840
	CCATCGGGTC GCCATTTCAA CCTATACCAC CAGGCTTGGG GCCGGTCCGG TCGCCATTTT	6900
	TGCGGCCGCG GTTTTGGCTC CAGGCTCCG CCTGGCTCTG CTGGAGGATA CTTTGTATTA	6960
25	TCCGGGGCGG GCGCACACAT TTGATGACTT CTGCCCTGAA TGCCGCGCTT TAGGCCTCCA	7020
	GGGTTGTGCT TTCCAGTCAA CTGTCGCTGA GCTCCAGCGC CTAAAGTTA AGGTGGGTAA	7080
30	AACTCGGGAG TTGTAGTTTA TTTGGCTGTG CCCACCTACT TATATCTGCT GATTTCTTTT	7140
	ATTTCTTTT TCTCGGTCCC GCGCTCCCTG A	7171

or a fifth sequence (SEQ ID NO.12):

35	CGGGCCCCGT ACAGGTCACA ACCTGTGAGT. TGACGAGCT AGTGGAGGCC ATGGTCGAGA	60
	AAGGCCAGGA TGGCTCCGCC GTCCTTGAGC TCGATCTCTG CAACCGTGAC GTGTCCAGGA	120
	TCACCTTTTT CCAGAAAGAT TGCAATAAGT TCACCACGGG AGAGACCATE GCCCATGGTA	180
40	AAGTGGGCCA GGGCATTTCG GCCTGGAGTA AGACCTTCTG TGCCCTTTTC GGCCCTGGT	240
	TCCGTGCTAT TGAGAAGGCT ATTCTGGCCC TGCTCCCTCA GGGTGTGTTT TATGGGGATG	300
45	CCTTTGATGA CACCGTCTTC TCGGCGCGTG TGGCCGCAGC AAAGGCGTCC ATGGTGTGTTG	360
	AGAATGACTT TTCTGAGTTT GACTCCACCC AGAATAATTT TTCCCTGGGC CTAGAGTGTG	420
	CTATTATGGA GAAGTGTGGG ATGCCGAAGT GGCTCATCCG CTTGTACCAC CTTATAAGGT	480
50	CTGCGTGGAT CCTGCAGGCC CCGAAGGAGT CCCTGCGAGG GTGTTGGAAG AAACACTCCG	540
	GTGAGCCCCG CACTCTTCTA TGAATACTG TCTGGAACAT GGCCGTTATC ACCCATTTGT	600
55	ACGATTTCCG CGATTTGCAG GTGGCTGCCT TAAAGGTGA TGATTGATA GTGCTTTGCA	660
	GTGAGTACCG TCAGAGTCCA GGGGCTGCTG TCCTGATTGC TGGCTGTGGC TAAAGCTGA	720

	AGGTGGGTTT CCGTCCGATT GGTGTTATG CAGGTGTGT GGTGACCCCC GGCCTTGGCG	780
	CGCTTCCCGA CGTCGTGGCG TTGTCCGGCC GGCTTACTGA GAAGAATTGG GGCCCTGGCC	840
5	CTGAGCGGGC GGAGCAGCTC CGCCTTGGTG TGGG	874

or a sequence complementary thereto.

- 10 14. A kit comprising, in a container or separate
containers, a pair of single-strand primers derived
from nonhomologous regions of opposite strands of a
DNA duplex fragment derived from an enterically
transmitted viral hepatitis agent whose genome
15 contains a region which is homologous to the 1.33 kb
DNA EcoRI insert present in plasmid pTZKF1(ET1.1)
carried in E. coli strain BB4 and having ATCC deposit
no. 67717.
- 20 15. The kit of claim 15, which are derived from
opposite strands of the EcoRI duplex insert in said
plasmid.
- 25 16. A method for detecting the presence of an
enterically transmitted nonA/nonB hepatitis viral
agent in a biological sample, comprising
 preparing a mixture of duplex DNA fragments
derived from the sample,
 denaturing the duplex fragments,
30 adding to the denatured DNA fragments, a pair of
single-strand primers derived from nonhomologous
regions of opposite strands of a DNA duplex fragment
derived from an enterically transmitted viral
hepatitis agent whose genome contains a region which
35 is homologous to the 1.33 kb DNA EcoRI insert present
in plasmid pTZKF1(ET1.1) carried in E. coli strain
BB4, and having ATCC deposit no. 67717,
 hybridizing said primers to homologous-sequence
region of opposite strands of such duplex DNA

fragments derived from enterically transmitted nonA/nonB hepatitis agent,

5 reacting the primed fragment strands with DNA polymerase in the presence of DNA nucleotides, to form new DNA duplexes containing the primer sequences, and repeating said denaturing, adding, hybridizing and reacting steps, until a desired degree of amplification of sequences is achieved.

10 17. The method of claim 16, wherein the primers are derived from opposite strands of the EcoRI duplex insert in said plasmid.

15 18. The method of claim 16, for detecting the presence of viral agent in a sample of cultured cells infected with the agent.

20 19. A vaccine for immunizing an individual against enterically transmitted nonA/nonB hepatitis viral agent comprising, in a pharmacologically acceptable adjuvant, a recombinant protein derived from an enterically transmitted nonA/nonB viral hepatitis agent whose genome contains a region which is homologous to the 1.33 kb DNA EcoRI insert present in plasmid pTZ-RF1(ET1.1) carried in E. coli strain BB4, and having ATCC deposit no. 67717.

25 20. The vaccine of claim 19, wherein the protein is derived from the EcoRI insert in said plasmid.

30

21. A vaccine for immunizing an individual against HEV comprising, in a pharmacologically acceptable adjuvant, a protein encoded by genetic sequence 406.3-2 or 406.4-2 or a fragment thereof.

35

22. In a method of isolating an enterically transmitted nonA/nonB viral agent or a nucleic acid fragment produced by the agent, an improvement which

comprises: utilizing, as a source of said agent, bile obtained from a human or cynomolgus monkey having an active infection of enterically transmitted non-A/non-B hepatitis.

5

23. The method of claim 22, wherein the bile is obtained from an infected cynomolgus monkey.

10 24. Human polyclonal anti-serum obtained from a human immunized with a protein derived from an enterically transmitted non-A/non-B viral hepatitis agent whose genome contains a region which is homologous to the 1.33 kb DNA EcoRI insert present in plasmid pTZKF1(ET1.1) carried in E. coli strain BB4
15 and having ATCC deposit no. 67717.

ADD
AL